

Stream Crossing Type

Surveyors qualitatively evaluated 136 stream crossing installations to determine if BMP recommendations were followed and whether there was a risk to water quality associated with the type of stream crossing installed (some sites had multiple crossings). Table 7 summarizes the frequency at which a given stream crossing type posed a risk to water quality. Data presented in Table 7 can be interpreted accurately using the following example sentence, replacing the words in *underlined italics* with the corresponding values in the table: When BMPs for *bridgemat* stream crossings were not properly implemented, there was a risk to water quality *9 percent* of the time.

Table 7. Stream Crossing Types That Posed a Risk to Water Quality

Stream Crossing Type	Stream Crossings Surveyed (Count)	Risk to WQ (Count)	Frequency of Risk to WQ (Percent)
Bridgemat	46	4	9 %
Culvert	39	19	49 %
Pole Crossing	31	7	23 %
Ford	15	4	27 %
Other*	5	2	40 %

*Other stream crossings surveyed included a barge, concrete pillar, construction I-beam, and logging debris.

Discussion – Stream Crossings

Implementation of BMPs for stream crossings increased in all regions of the state by five percent or more when compared to the previous survey. However, implementation of stream crossing BMPs was lower on average when compared to other BMP categories, and non-implementation frequently resulted in a risk to water quality. While implementation of BMPs for stream crossings has increased on average across the state, there is still room for improvement. This is particularly true for the BMPs recommending that 1) stream crossing approachways have *water control* devices to minimize erosion and 2) road surfaces and cut banks within the SMZ are *stabilized* as soon as practical. Implementation of these two BMPs decreased notably in the Mountains region, where non-implementation frequently resulted in a risk to water quality. As expected, a risk to water quality was frequently observed when use of the stream *channel* as an access road or skid trail was not *avoided* and when specific recommendations for a given stream *crossing type* were not used. When these BMPs were not implemented in the Mountains, however, a risk to water quality was less frequently observed. This could have been related to how surveyors perceived a risk to water quality in dry stream channels. Guidance and methodology on how to access risk to water quality in dry stream channels will be incorporated into future surveys.

Of the four most commonly used stream crossing types (bridgemat, culvert, pole crossing, and ford), installation or use of bridgemats had the fewest observed risks to water quality when compared to the number of times they were assessed. Conversely, improper or lack of BMP implementation on culvert crossings resulted in a risk to water quality nearly half the time. The components associated with installing culverts that led to relatively high risk to water quality were not assessed with this Survey. Future surveys will more closely assess individual aspects of different stream crossing alternatives in an attempt to identify the specific components that pose the greatest risk to water quality.

These data indicate there are challenges to implementing stream crossing BMPs and non-implementation is frequently a water quality stressor. Therefore, avoiding stream crossings on harvest sites when feasible will provide notable water quality protection. However, when installation of stream crossings is unavoidable, the use of bridgemats would seem to provide the greatest water quality protection when compared to other crossing alternatives. The NCDFR has provided bridgemats on loan to loggers for establishing temporary crossings since the mid-1990's. These bridgemats are intended to serve as a demonstration tool for loggers to observe and experience the operational and environmental benefits of using bridgemats. Survey data generally validates the usefulness of NCDFR's bridgemat loan program.